

Aluminium

From Wikipedia, the free encyclopedia
 (Redirected from Aluminum)

Aluminium or aluminum (see the spelling section below) is the chemical element in the periodic table that has the symbol Al and atomic number 13. It is a silvery and ductile member of the poor metal group of chemical elements. Aluminium is found primarily as the ore bauxite and is remarkable for its resistance to corrosion (due to the phenomenon of passivation) and its light weight. Aluminium is used in many industries to make millions of different products and is very important to the world economy. Structural components made from aluminium and its alloys are vital to the aerospace industry and very important in other areas of transportation and building in which light weight, durability, and strength are needed.

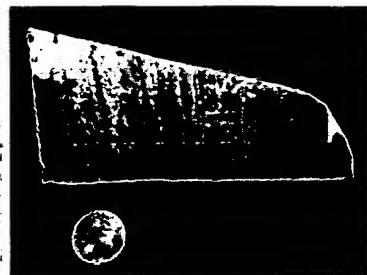
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Properties

Aluminium is a soft and lightweight metal with a dull silvery appearance, due to a thin layer of oxidation that forms quickly when it is exposed to air. Aluminium is nontoxic (as the metal), non-magnetic, and non-sparking. Pure aluminium has a tensile strength of about 49 megapascals (MPa) and 400 MPa if it is formed into

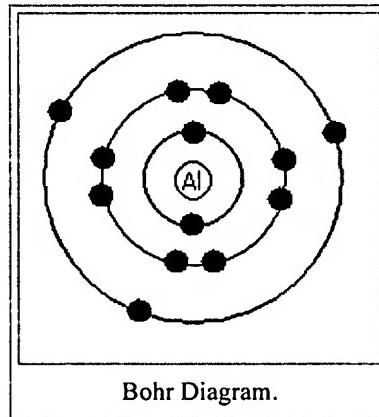
13		magnesium ← aluminium → silicon					
B ↑ Al ↓ Ga	 periodic table						13P 14N
General							
Name, Symbol, Number		aluminium, Al, 13					
Chemical series		poor metals					
Group, Period, Block		13, 3, p					
		silvery					
Appearance							
Atomic mass		26.9815386(8) g/mol					
Electron configuration		[Ne] 3s ² 3p ¹					
Electrons per shell		2, 8, 3					
Physical properties							
Phase		solid					
Density (near r.t.)		2.70 g/cm ³					
Liquid density at m.p.		2.375 g/cm ³					
Melting point		933.47 K (660.32 °C, 1220.58 °F)					
Boiling point		2792 K (2519 °C, 4566 °F)					
Heat of fusion		10.71 kJ/mol					
Heat of vaporization		294.0 kJ/mol					
Heat capacity		(25 °C) 24.200 J/(mol·K)					
Vapor pressure							
P/Pa	1	10	100	1 k	10 k	100 k	
at T/K	1482	1632	1817	2054	2364	2790	
Atomic properties							
Crystal structure		cubic face centered					
Oxidation states		3 (amphoteric oxide)					
Electronegativity		1.61 (Pauling scale)					
Ionization energies (more)		1st: 577.5 kJ/mol 2nd: 1816.7 kJ/mol					



A piece of aluminium metal about 15 centimetres long, with a US penny included for scale.

an alloy. Aluminium is about one-third as dense as steel or copper; is malleable, ductile, and easily machined and cast; and has excellent corrosion resistance and durability due to

the protective oxide layer. Aluminium mirror finish has the highest reflectance of any metal in the 200-400 nm (UV), and the 3000-10000 nm (far IR) regions, while in the 400-700 nm visible range it is slightly outdone by silver, and in the 700-3000 (near IR) by silver, gold and copper. It is the second most malleable metal (after gold) and the sixth most ductile. Aluminium is a good heat conductor which is why it is used to make saucepans.



					3rd: 2744.8 kJ/mol
Atomic radius		125 pm			
Atomic radius (calc.)		118 pm			
Covalent radius		118 pm			
Miscellaneous					
Magnetic ordering		paramagnetic			
Electrical resistivity	(20 °C)	26.50 nΩ·m			
Thermal conductivity	(300 K)	237 W/(m·K)			
Thermal expansion	(25 °C)	23.1 μm/(m·K)			
Speed of sound (thin rod)	(r.t.) (rolled)	5000 m/s			
Young's modulus		70 GPa			
Shear modulus		26 GPa			
Bulk modulus		76 GPa			
Poisson ratio		0.35			
Mohs hardness		2.75			
Vickers hardness		167 MPa			
Brinell hardness		245 MPa			
CAS registry number		7429-90-5			
Notable isotopes					
Main article: Isotopes of aluminium					
iso	NA	half-life	DM	DE (MeV)	DP
²⁶ Al	syn	7.17×10^5 y	β^+	1.17	²⁶ Mg
			ε	-	²⁶ Mg
			γ	1.8086	-
²⁷ Al	100%	Al is stable with 14 neutrons			

References

Applications

Whether measured in terms of quantity or value, the use of aluminium exceeds that of any other metal except iron, and it is important in virtually all segments of the world economy.

Pure aluminium has a low tensile strength, but readily forms alloys with many elements such as copper, zinc, magnesium, manganese and silicon (e.g. duralumin). Today almost all materials that claim to be aluminium are actually an alloy thereof. Pure aluminium is encountered only when corrosion resistance is more important than strength or hardness. Conversely, the term "alloy" in general use today usually means aluminium alloy.

When combined with thermo-mechanical processing aluminium alloys display a marked improvement in mechanical properties. Aluminium alloys form vital components of aircraft and rockets as a result of their high strength to weight ratio.

Aluminium is an excellent reflector (~99%) of visible light and a good reflector (~95%) of infrared. A thin layer of aluminium can be deposited onto a flat surface by chemical vapor deposition or chemical means to form optical coatings and mirrors. These coatings form an even thinner layer of protective aluminium oxide that does not deteriorate as silver coatings do. Nearly all modern mirrors are made using a thin coating of aluminium on the